Terminal High Altitude Area Defense System (THAAD)

Integrated Program Management Lessons Learned (U)

Presented to the

Defense Acquisition University
Southern Region 5th Annual Acquisition Conference

18-19 February 2009

Bill Smart

First Principles of Integrated Project Management (U)

- Integrated Organization, Decision Processes, and Information Flow
- Place emphasis on an Integrated, Network Schedule (IMS)
- Breath life into the Risk Management Process
- Integrate Risk and Earned Value Management (EVM)
- Use Earned Value as a Management Tool
- Integrate DCMA into the project team (and really mean it)
- Sustain an effective, joint (Govt/Contractor) Surveillance Program

Integrated Organization, Decision Processes and Information Flow

Integrated By Design (U)

09T-1043.03

- **Program Management Organization**
  - Program Integration Division
    - Coordination of the program's Battle Rhythm
    - Network Schedules and Schedule Risk Analysis
    - EVM (includes joint DCMA surveillance)
    - Risk Management Process
    - Programmatic Tasks (Congressionals, reviews, program level briefings, DCMA interface, Acquisition Documentation, GAO/audits focal point)
    - Program Integrators Embedded in the subordinate Product Offices / Directorates
  - Cost & Financial Management Team - a "sister" Division to Program Integration (business, cost estimating and

Organization Designed to Support Integration

Goal Alignment and Key Meetings (U)

09T-1043.04

- **The THAAD Program has aligned its' Goals to those of the MDA Director to insure everyone working on THAAD is helping accomplish the MDA Mission**
- **Key Meetings established and designed to move information from lower to higher levels and get decisions at appropriate levels**
- **A "Battle Rhythm" was developed to insure mutual support and information is shared and form the basis for Program Integration**
- **The Goal Round-Tables (GRTs) are the center piece of that Battle Rhythm**
  - A weekly Contractor / Government meeting jointly chaired
  - [illegible]tc.)
- **[illegible]utually [illegible] expectations and outcomes**

PMs/Dirs "Counterparts" from Prime and Government Support GRTs

Battle Rhythm Meeting Hierarchy (U)

09T-1043.05

Budget/Finance, Cost, Schedule, EVM and Contract Issues Discussed

PLC
(Program Leadership Council)

Decisions Made

PM IPT
(Program Mgmt IPT)

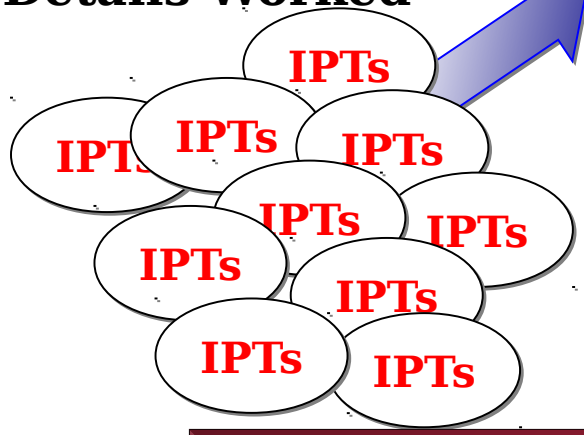
IIPT

Issues Discussed Solutions Proposed

chnical/Programmatic Data Gathered Details Worked

GRTs
(Goal Round Tables)

Status Tracked Issues Raised



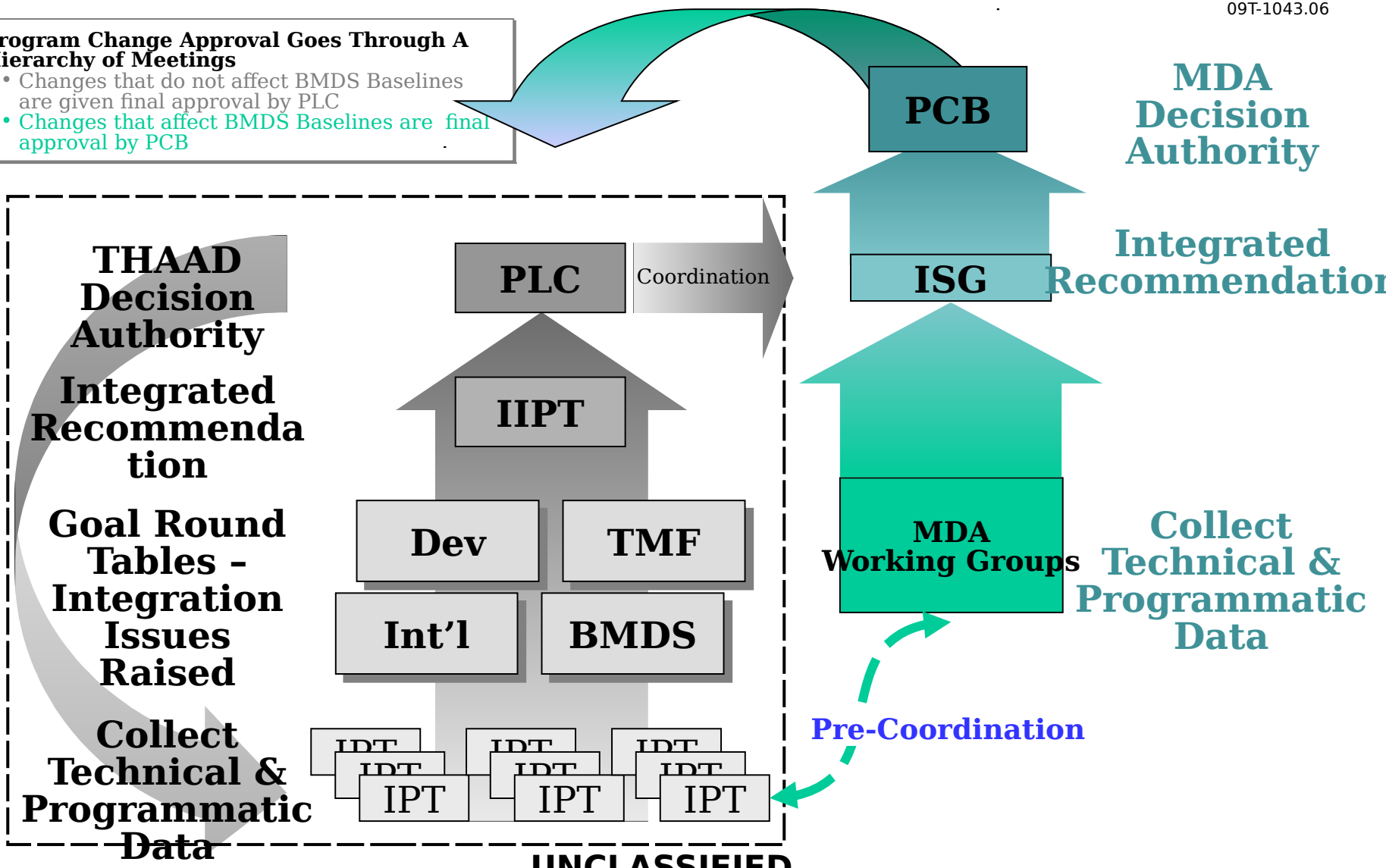
Size and Complexity Drives a Weekly Cycle

Approval Authority Process Flow (U)

09T-1043.06

Program Change Approval Goes Through A Hierarchy of Meetings

- Changes that do not affect BMDS Baselines are given final approval by PLC
- Changes that affect BMDS Baselines are final approval by PCB



Place Emphasis on an Integrated, Network Schedule (IMS)

Integrated Schedules Are the Key (U)

09T-1043.07

- **The Contractor Integrated Master Schedule (IMS) -** the detailed, interrelated, WBS Designed, plan of activities around which all prime and subcontracted activities are planned and statused.

- **The Government Integrated Master Schedule (GIMS) -** the detailed plan of activities from the government (GFE/GFI/GFS/GFF) that are provided in support of the program and linked to the IMS where appropriate.

- **Linking and maintaining the IMS and GIMS -** all the relationships between government and contractor activities can be seen and impacts and effects easily tracked.

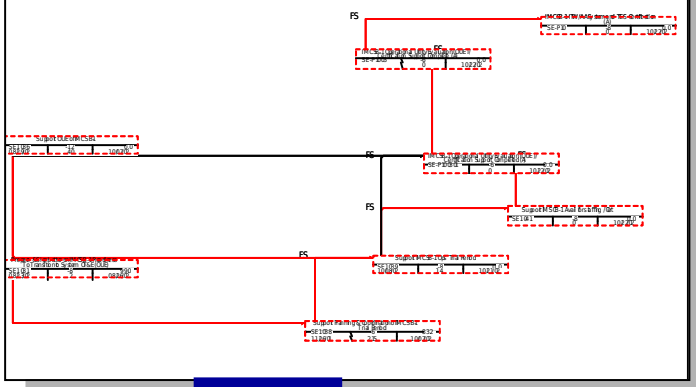
- **Combined Integrated Master Schedule (CIMS) -** a linked summary network schedule with all Prime and Government A used fo

Buy-in by the Prime and an Integrated Gov/Prime Team is Required

Schedule Hierarchy Fully Integrated and Linked within IMS (1)

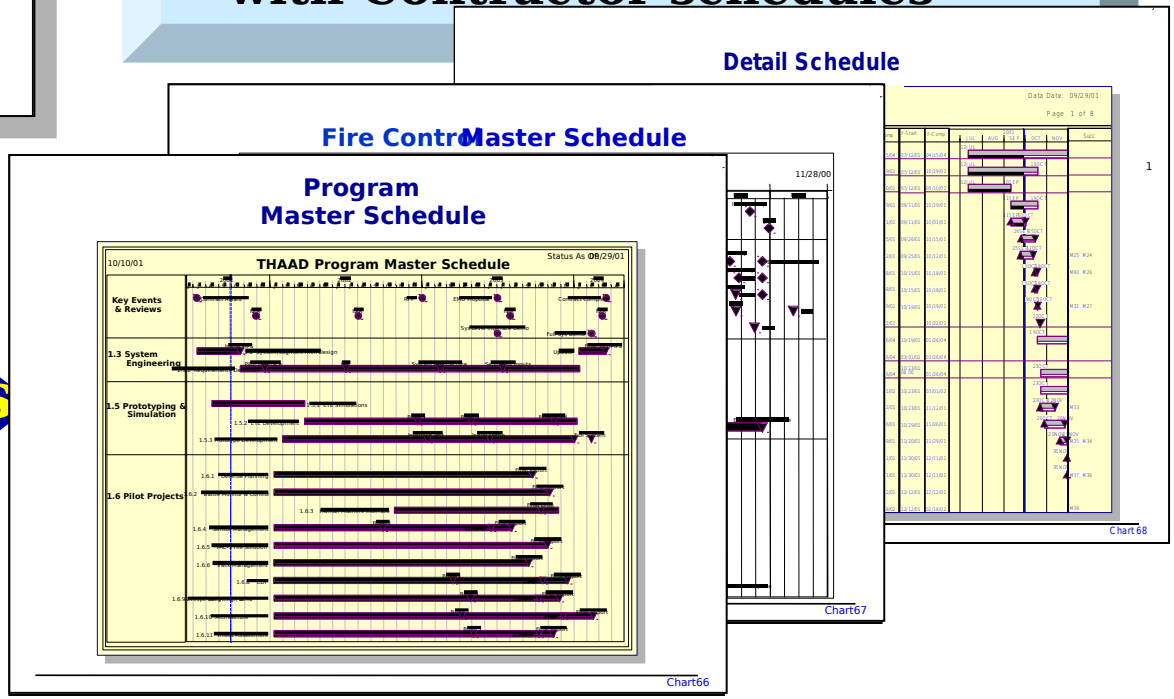
09T-1043.08

Networked IMS



- **All Contractor schedules produced out of a <u>Single, Integrated Database</u>**
- **Government IMS (GIMS) integrates interdependencies with Contractor schedules**

Produces



Integrated Schedules Benefits (U)

09T-1043.09

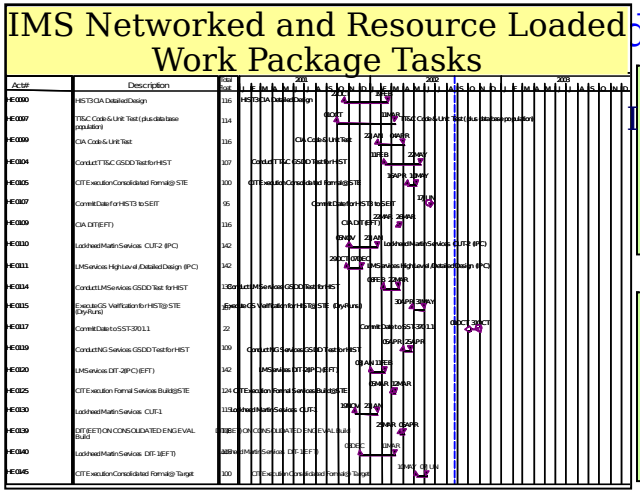
- **Detailed Network Analysis Provide:**
  - a predictor of future outcomes
  - used as a tool for program planning, critical path analysis, logic checks, “choke” point, and network health and status metrics
- **Summary level networks (models) provide:**
  - a tool to conduct “what-if” drills for quick look impacts,
  - workarounds, and opportunities
- **Network Risk Analysis -** analytical tool that can show the areas of risk and associated sensitivities (volatility) of the Summary Level Network
  - The results of the Schedule Network Analysis are used to identify opportunities in the program plan
  - @Risk is the THAAD Schedule Risk Model tool for Integrated

Integrated Schedules are the Center Piece to Integrated Assessments

Cost and Schedule Integration (U)

09T-1043.10

- **Detailed IMS is the foundation of the PMB and EV Status**
  - All schedules come from a single integrated data base
  - All activities and milestones are linked into the IMS
  - Work Package tasks are linked and resource loaded
  - Risk mitigation plans integrated into IMS
  - directly output from weekly



IMS Planning Provides
BCWS
Directly to CostView

IMS Status Provides
BCWP
Directly to CostView

EVM DATABASE (CostView)

EVM Process Founded on the IMS Schedule and Cost Planning & Status are Integrated as ONE Process

Breath Life into the Risk Management Process

Tenants of An Effective Risk Management Process (U)

09T-1043.11

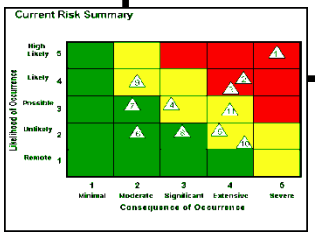
- **A joint Risk Working Group (RWG) that meets monthly, with Govt / Contractor reps from all the components**
- **IPTs that develop proactive plans to mitigate and reduce risks identified.** (Techniques for risk mitigation must be real - include avoidance, control, transfer and/or assumption strategies (assumption is worst strategy)
- **Risk mitigation steps must have an IMS Activity ID number**
- **A joint Chief Engineer's monthly RWG review to determine what to bring before the Govt/Contractor PMs**
- **A monthly Govt/Contractor PM forum to status risks and get guidance on mitigation or resolution**
- **Risk are managed by the Program Integration Group and used to develop Schedule and other Risk assessments**

Risk Must Consider Cost, Schedule, And Technical Implications And Be Integrated Into The Total Management Process

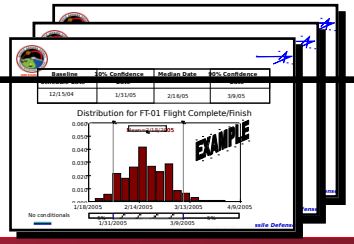
THAAD Risk Process Overview (U)

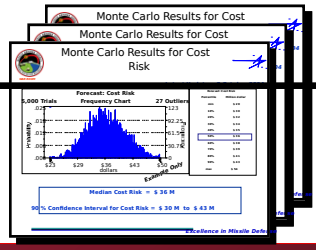
09T-1043.12

WSEIT
CSE
GRTs
PLC
IPTs
IIPT
IBR
EVM Reviews
TFC
Govt Risks
IPTs Identify and Assess Risk
Components Develop Mitigation Plans
RWG Level
Prioritize Risk Items for Program
WSEIT Review / Concurrence
IIPT Approval
PLC Direction
Implement Mgt Direction
Status / Mitigation via IMS/GIMS
Document Contingency Plan
Retire Risk



No.	Description	Risk Rating	Impact To
1	Radar Discrimination (Advanced Algorithm)	5x5	Dev
2	Optical Block for Booster Initiation	4x4	Dev
3	TFCC Requirements Compliance-NBC	4x4	Dev
4	PPU Weight	3x3	Dev
5	LIOS Producibility	2x4	Field
6	TARS Producibility	2x2	Field
7	World Wide Transportability	3x2	Field
8	Parts Obsolescence	2x3	Field
9	FTT-14 Target Availability	4x2	Dev
10	Missile Assembly Qualification Thermal Margin	2x4	Dev
11	EE09	3x4	Dev

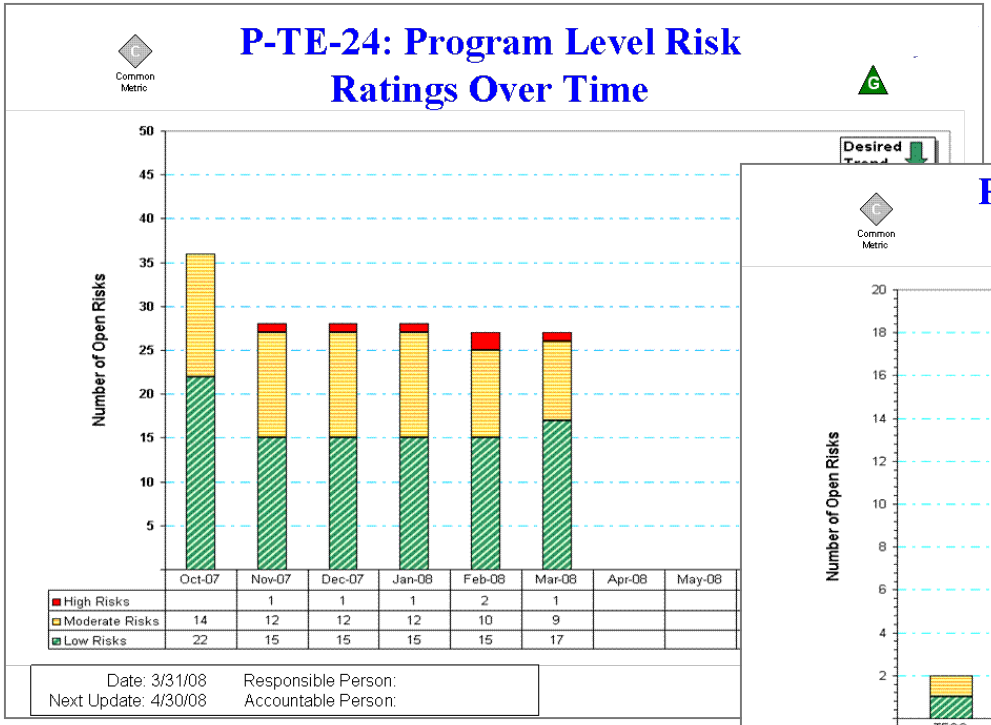


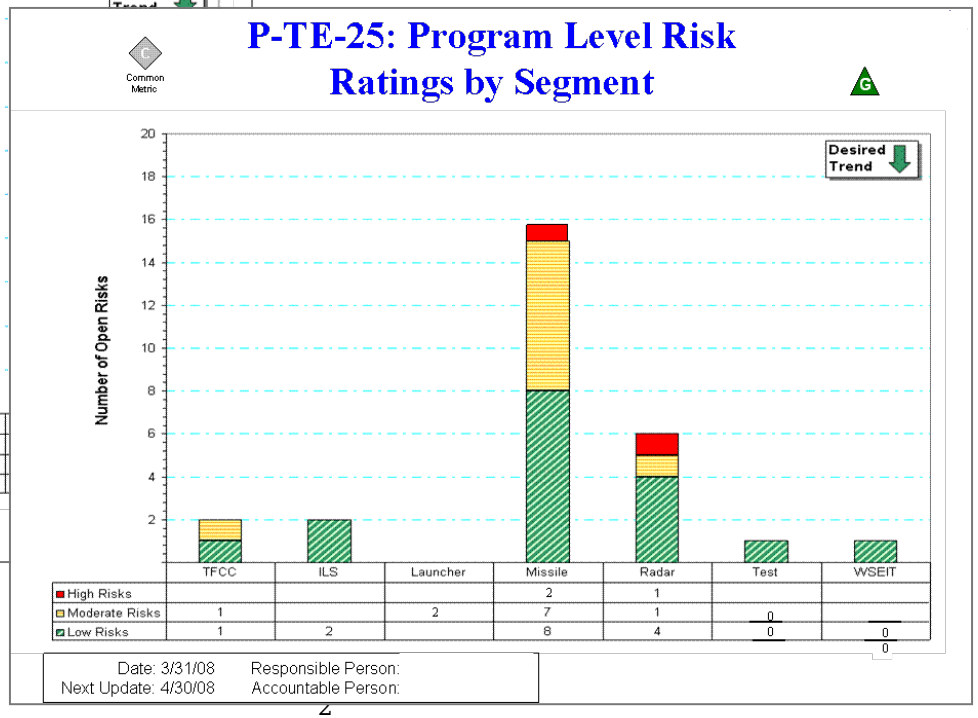


The THAAD Risk Management Process Encompasses Processes And Tools That Have Been Matured And Used Throughout The System Development Process

Metrics are Maintained and Used (U)

09T-1043.13





The THAAD Risk Management Process Provides Statistics And Tracks All System Level Risks And Provides Feedback To Senior Management.

Integrate Risk and EVM

Integration of Risk and EVM (U)

- **Schedule reserves <u>integrated into baseline</u> process**
  - Schedule Target dates Ahead of Baseline Dates are managed to
  - IBR process facilitated and validated risk identification and associated risk budgets; surveillance process provides risk refresh
- **Cost Targets (ETC/EAC) established to build in program cost reserve**
- **Risk Steps from Risk Management Database Integrated in IMS and statused weekly**
- **Probabilistic Risk and Sensitivity Analysis performed on IMS**

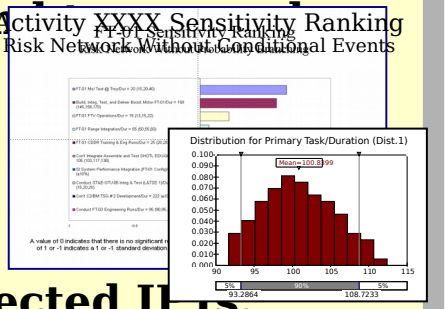
THAAD Risk Management Integration into EVM (U)

- Probabilistic Risk and Sensitivity Analysis Performed on IMS -

09T-1043.15

What:

- **Utilizes Summary Network (1500 tasks) encompassing the Development and Production Contracts**
- **Incorporated Probabilistic Schedule Risk Analysis using @Risk for MS Project**
- **Analyzed cum past performance, variances, trends, and [illegible] focused on:**
  - HW/SW deliveries
  - Flight/Ground Testing
  - Fielding Activities (Training, User Certification, etc.)
- **Schedule Sensitivity Ranking was used to identify affected IPTs.**
- **1000 iterations of Schedule Risk Model to determine results**
- **Variation in milestone completions were collected at 20% (Min) and**



Result:

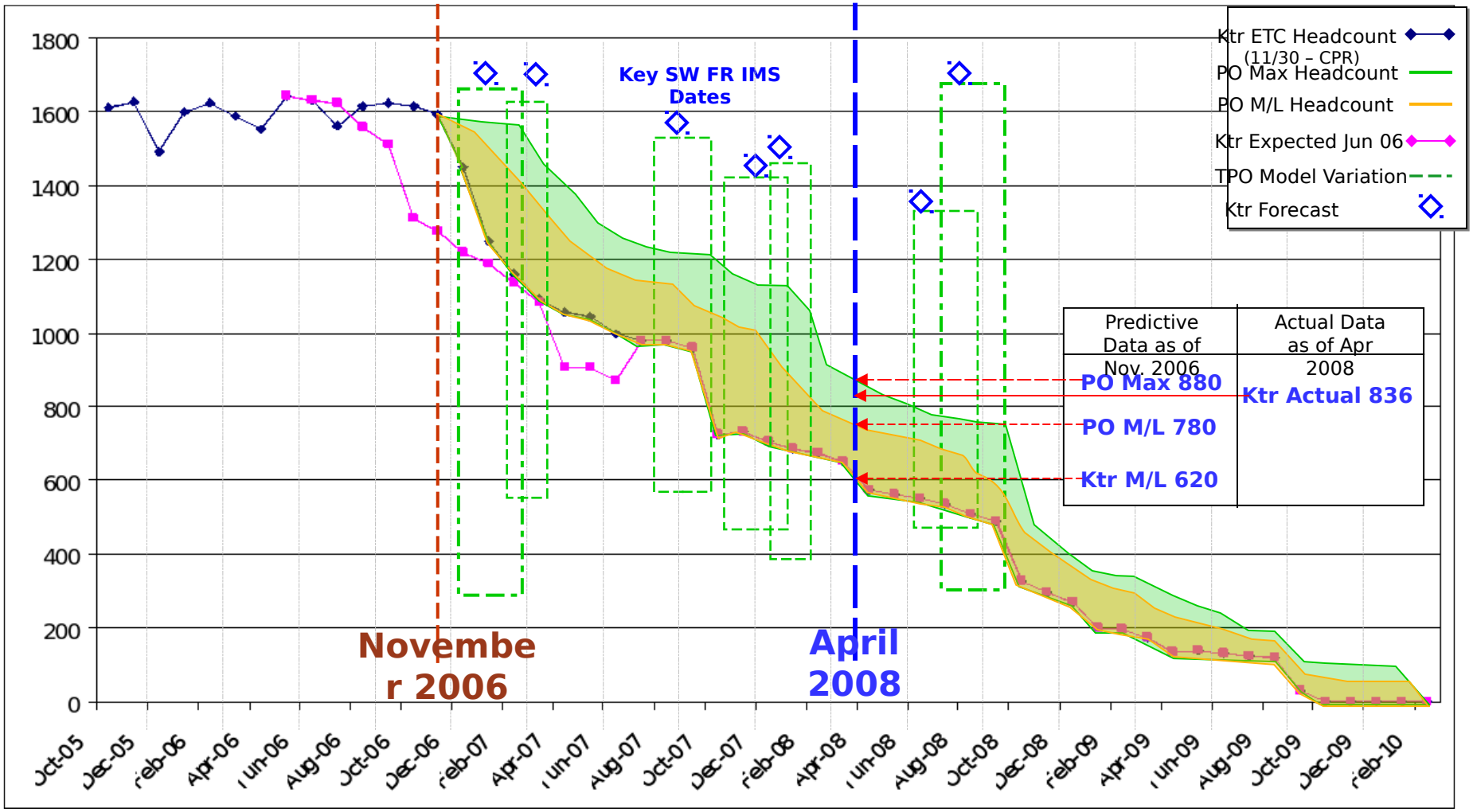
- **Sound analytical understanding of risk ranges and criticality of items driving the program risk**
- **Provides basis for application of schedule work arounds and opportunities as appropriate**

Provides Management with Statistical Prediction of

Program Schedule for Proactive Management

Model Results Show Changes in Total Program Head Count (U)

09T-1043.16



Use Earned Value – Faster Data, a Battle Rhythm with Senior Management, Govt Bottoms Up CEAC

THAAD Earned Value Battle Rhythm (U)

09T-1043.17

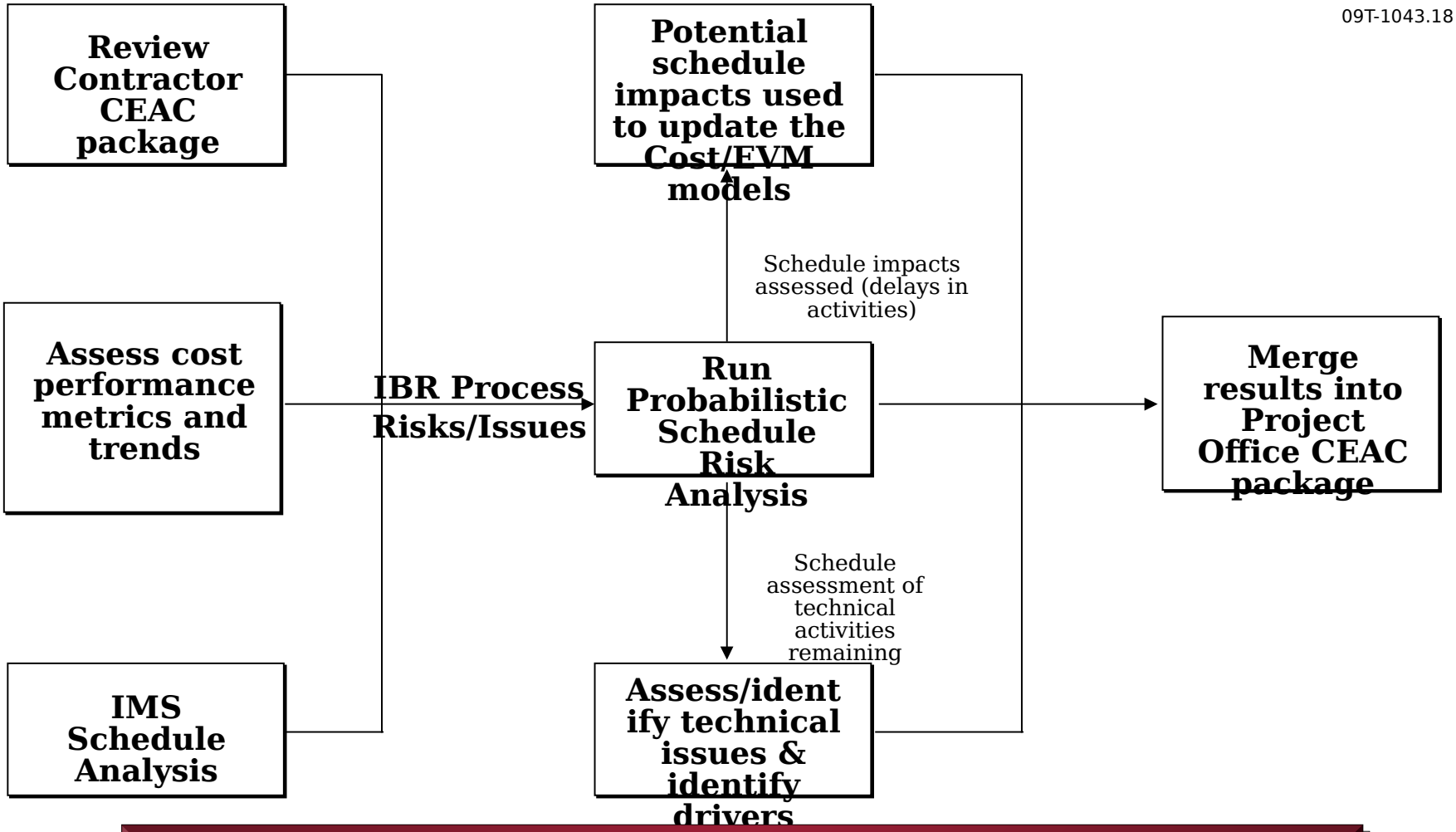
Effective Battle Rhythm established and maintained

- **Current/accurate status to Contractor & project office management while still useful**
  - Fully statused IMS provided electronically each Monday
  - Current subcontractor data always integrated (in by Day 5)
  - WBS Earned Value status provided on 8th work day after month end --- with Current Month Subcontractor Data
  - Joint Govt/Contractor management reviews two weeks after month-end
- **Allows Contractor and project office management to focus forward**
  - Data is used Proactively
  - CAMs tracked to baselines and forecasts (to include 3-month, forward looking forecast of SV and CV burn down plans)

EVM Process Minimizes Reporting Spans and Maximizes Data Usefulness

Government Bottoms Up CEAC Process (U)

09T-1043.18


Review Contractor CEAC package
Assess cost performance metrics and trends
IMS Schedule Analysis
IBR Process Risks/Issues
Potential schedule impacts used to update the Cost/EVM models
Schedule impacts assessed (delays in activities)
Run Probabilistic Schedule Risk Analysis
Schedule assessment of technical activities remaining
Assess/identify technical issues & identify drivers
Merge results into Project Office CEAC package

Alternative Approach to "Gold Card" Formula

Integrate DCMA into the Project Team and Implement an effective CAM Surveillance Program

Integrate DCMA into the Project Team (U)

09T-1043.19

- **What:** Leverage the resources and expertise of DCMA as an extension of the project office team, i.e., don't just do a LOD, write a boilerplate MOA, and operate as if they're not in the plant
- **Why**
  - Facilitate effective communications with DCMA Team
  - Recommend near term surveillance focus areas
  - Highlight areas needing improvement
  - Recognize outstanding support provided
- **How**
  - Use performance-based MOA as vehicle to establish reliance on DCMA team members
  - Establish DCMA reps as members of joint Govt/Contractor IPTs / AF Board
  - Calendar recurring forums for DCMA to provide insight, highlight emerging issues
  - Rely on DCMA as valued team members and they will contribute significantly
  - Have a feedback loop to communicate their contributions to the team

Comprehensive CAM Surveillance (U)

09T-1043.20

CONTROL ACCOUNT EVALUATION GUIDELINES Rev Mar

CONTROL ACCOUNT: **CAM:**
DATE 17-Mar-04 **TPO LEAD:**

These questions have been prepared to aid in evaluating a CAM's knowledge and use of EVM, the application of the process, the accuracy of the performance data, and schedule and cost risk. They are intended to be used as a guide and do not have to be followed exactly or asked in their entirety. Ratings of red, yellow or green are defined as follows:

CAM Knowledge
Red: CAM has no Knowledge and training is required.
Yellow: CAM has limited knowledge and followup may be required.
Green: CAM is knowledgeable.

Process Application
Red: Process not being applied (major fix required)
Yellow: Process needs improvement (moderate fix required)
Green: Process well implemented and being executed

	CAM Knowledge			Process Application		
	RED	YELLOW	GREEN	RED	YELLOW	GREEN
Section 1: PLANNING AND IMPLEMENTATION						
Section 1 addresses work authorization, tracing it through planning and implementation.						
1.1 Show me your latest work authorization document						
1.2 Show me the schedule you are working to and how it supports the master schedule						
1.3 Show me how your resources are planned in the schedule						
1.4 Show me your process for claiming your discrete work						
1.5 Explain how much of your budget is LOE and why						
1.6 Show me your process for assuring the resources in the schedule are linked to the budget dollars						
1.7 Show me your critical activities						
1.8 Show me your horizontal schedule traceability within your tasks and component						
1.9 Show me your vertical schedule traceability in support of the Master Sch						
1.10 Show me how your subcontract/WTA effort is planned						
1.11 Show me how your material and travel effort is planned						
Section 2: PERFORMANCE DATA						
Section 2 addresses performance data, how it is derived, what it means and how it is used.						
2.1 Show me who is charging your effort and how you manage that costs						
2.2 Show me your current period and cum to date perform						
2.3 Show me the detail that supports your schedul						
2.4 Explain how your performance status was determi						
2.5 Show me the detail that supports your cost v						
2.6 Show me your backup to support the sub						
2.7 Show me how you developed your 3 mon						
2.8 Show me what you use to review your						
Section 3: ESTIMATE TO COMPLETE/ E AT COMPLETION						
Section 3 addresses the ETC/EAC supporting data and what is done to manage it.						
3.1 What is your EAC? When did you						
3.2 Show me how your to go						
3.3 Show me your plan for						
3.4 Show me your plan						
3.5 Show me your						
3.6 Show me w						
Section 4: OVERALL EVALUATION						
Section 4 addresses the interviewer's overall assess						
4.1						
4.2						
4.3 Does the performance data support the EAC?						
4.4 Are the actual headcount tracking to the EAC in current period? If not what is the recovery plan?						
4.5 How much risk is in the EAC?						
Section 5: RISK IDENTIFICATION						
5.1 Is there an unreported cost risk associated with this cost account?						
5.2 Is there an unreported schedule risk associated with this cost account?						
Section 6: CONCERNS AND COMMENTS						

CAM Surveillance + Discussion Guide

- **Ensures data integrity**
  - Interview 10% of CAMs Monthly by Component (~8 CAMs per Month)
  - CAM / Project Office counterparts conduct discussions with business leads and DCMA supporting
- **Distinguish Between Process Implementation Issues and CAM Knowledge**
- **Findings Not Grounds for AF Penalty**
  - Govt & Contractor management want to find any CAM or process issue before it becomes a problem

Results in Significant Improvements to Consistent Process Implementation and Data Integrity

CAM Surveillance Program (U)

- Statused Monthly to Program Managers -

LOCKHEED MARTIN

CAM Surveillance Sample Scorecard

Chart 97

LOCKHEED MARTIN

CAM Surveillance Statistics Sample

CAM Interview Scorecard

Comp	Req	CAM	CAM KNOWLEDGE: Planning & Impl	EVM Data	ETC/EAC	Overall Evaluation	PROCESS APPLICATION: Planning & Impl	EVM Data	ETC/EAC	Overall Evaluat
C2/BM	1	Reese	G	G	G	G	G	G	G	G
Radar	2	Cassidy	G	G	G	G	G	G	G	G
		Mc Intosh	G	G	G	G	G	G	G	G
Missile	7	Dennis Lowe	G	G	G	G	G	G	G	G
		Nick Gonzales	G	G	G	G	G	G	G	G
		Randy Logue	G	G	G	G	G	G	G	G
		Dave Beebe	G	G	G	G	G	G	G	G
		Ralph Littral	G	G	G	G	G	G	G	G
		Noelle Nguyen-Phuc	R	Y	Y	Y	R	Y	Y	Y
		Quaranta	G	Y	Y	Y	G	Y	Y	Y
		Shaw	G	G	G	G	G	G	G	G
		Whaley	G	G	G	G	G	G	G	G
Launcher	1	Sposato	Y	G	G	Y	Y	G	G	Y
		Cleary	G	G	G	G	Y	Y	R	R
PM	1	McGuire	G	G	G	G	G	G	G	G
ILS	1	Tate	G	G	G	G	G	G	G	G
WSEIT	1	Sims	G	G	G	G	G	G	G	G
Test	1	Oberst	Y	G	G	G	Y	G	G	G

Total 15

BASIS FOR EVALUATION

CAM Knowledge	Red:	CAM has no Knowledge and training is
	Yellow:	CAM has limited knowledge and followu
	Green:	CAM is knowledgeable.
Process Application	Red:	Process not being applied (major fix req
	Yellow:	Process needs improvement (moderate
	Green:	Process well implemented and being ex

Concerns:

Chart 98

LOCKHEED MARTIN

EVM Action Item Log

Component	CAM	Action Item	Due Date	Status
Missile	Balt	Format 5 detail		Closed
All		Explain Standard labor rates	4-30-04	
Launcher	Sposato	Where does Pac 3 fit into Launcher master schedule?	3-19-04	
Test	Oberst	Signed WADS to IPT level	3-19-04	
Test	Oberst	Provide traceability of WP BGA LA025N to IMS tasks.	3-19-04	

Note: not a Risk log, only applicable to specific corrective EVM actions

Chart 99

LOCKHEED MARTIN

Training Log

Component	CAM	Training Required	RCD	Status

Chart 100

Summary (U)

- **THAAD is not the "perfect project" nor do we hold patents on integrated program management; but,**
- **Our systems include reliance in rigorous business processes for effective planning and control**
- **Why does the THAAD Process Work?**
  - Summary Network - IMS and GIMS are the foundations to all other integrated analysis
  - Program is "Designed" around Integration Process
  - Government Integration Team is uniquely placed in the program
  - Strong Skills in Schedule, Cost, EVM, Risk, and Systems Engineering
  - Genuine Government/Contractor IPT Approach
- **EVM and Risk Management are key tools in our toolbox**
- **We believe we've raised the bar on effective teaming with our contractor and DCMA support team**